



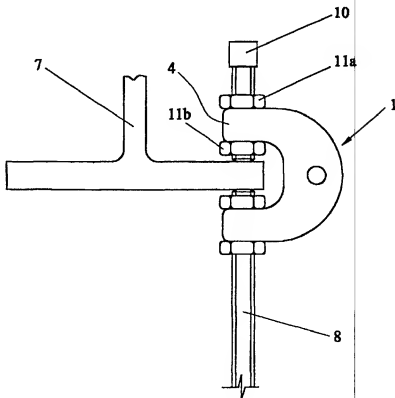
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB00/00527 (22) International Filing Date: 17 February 2000 (17.02.00) (30) Priority Data: 9904464.6 27 February 1999 (27.02.99) GB (71) Applicant (for all designated States except US): TYCO EUROPEAN METAL FRAMING LIMITED [GB/GB]; Victoria Road, Leeds LS11 5UG (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): GILL, Neil, Frank [GB/GB]; 10 Wrose Avenue, Wrose, Shipley, West Yorkshire BD18 1NS (GB). HARVEY, Simon [GB/GB]; 10 Lime Grove, Rawdon, Leeds LS19 6BZ (GB). JORDAN, Matthew [GB/GB]; 155 Carbottom Avenue, Bankfoot, Bradford BD5 9BD (GB). KLIPPEL, Simon [GB/GB]; Twincott, No. 4 Village Terrace, Old Scriven, Knaresborough, North Yorkshire HG5 9DU (GB). (74) Agent: STUTTARD, Garry, Philip; Urquhart-Dykes & Lord, Tower House, Merion Way, Leeds LS2 8PA (GB).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i></p>

(54) Title: **CLAMP**

(57) Abstract

A beam clamp (1) for attaching fixing brackets and the like to a structural beam (7) comprising twin horse-shoe shaped plates connected by bosses (4) defining a path for a fastening means (8, 10, 11a, 11b). The clamp enables the fastening means to form an integral part of the clamping effect.



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CLAMP

The present invention relates to an improved clamp for attaching structural components such as fixing brackets, pipe supports, electrical conduits or any other such structural component to a structural beam.

A conventional beam or flange clamp for securing building components to beams comprises a main body which is drilled or tapped at its rear portion in order to secure a drop rod outside and separate to the clamping region by means of rivets or bolts. This clamp achieves a direct clamping effect by means of set screws on the front portion. The operation of this device is illustrated schematically in Figure 5 attached hereto and described hereinafter.

The load bearing characteristics of the conventional clamp are largely unsatisfactory. For example, a load applied to the drop rod exerts a significant disruptive moment about the separate clamping region.

The present invention is based on the recognition that the clamping characteristics of a beam clamp may be improved by making the drop rod an integral part of the clamping effect. The beam clamp of the present invention then has the option to utilise the normal drop rod attachment point for the attachment of additional components. The invention therefore represents a versatile device which forms a discrete element of a clamping assembly.

Thus viewed from one aspect the present invention provides a beam clamp comprising:

two overlapping, substantially C-shaped plates having two arms extending from an arcuate rear portion, wherein adjacent arms on said plates are interconnected by means of a

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boss, wherein each boss defines a substantially tubular, non-threaded path capable of receiving an elongate fastening means or drop rod.

One of the advantages of the invention is the versatility of the clamp which adds to its cost effectiveness. It may be used in any number of situations with beams and threaded fasteners having a range of shapes and sizes. For example, the beam clamp of the invention may be used effectively on tapered beams which is less than straightforward with a conventional beam clamp.

By inserting the drop rod in the lower boss and securing it to the underside of the beam, the beam clamp of the invention makes the drop rod a load-bearing element acting directly at the clamping region. The drop rod is therefore integral to the clamping effect. Loads of up to two thirds of a ton may be applied.

In general, the rear section of the beam clamp is placed into compression as the clamp is tightened onto the beam and loads are applied to the drop rod. It has been recognised that there is a need to optimise the cross-sectional area through the rear of the substantially C-shaped plates. Preferably, the or each substantially C-shaped plate has a non-uniform width. Particularly preferably, the rear portion of the or each substantially C-shaped plate is broader than the arms. Especially preferably, the width of the or each substantially C-shaped plate increases progressively from the arms to the rear portion. Typically, the ratio of the plate width at an arm to the plate width at the rear is in the range 0.40 to 0.70, preferably 0.50 to 0.65, particularly preferably 0.55 to 0.60. Equally significant is the ratio of the length of the arms of the substantially C-shaped plate to the clamp width.

In use, the beam clamp of the invention is hooked straightforwardly onto the edge of a beam (so that the edge of the beam is located in the jaws of the beam clamp) and secured by passing an elongate fastener and / or drop rod through a boss. Suitable elongate fasteners are generally threaded fasteners which are fastened with suitable bolts. One or more of these may be used to fasten the beam clamp of the invention to the beam. Equally, the drop rod may be threaded and fastened to the underside of the beam using suitable bolts. The drop rod and/or elongate fastening means are preferably secured by two nuts. A twin set screw arrangement on the drop rod and elongate fastener is generally preferred to improve pull-off loads.

The interior edge of the rear portion of the or each substantially C-shaped plate (i.e. the interior of the jaw) is preferably provided with a flattened portion. This advantageously assists the beam clamp to mate with the edge of a beam in the jaws of the substantially C-shaped plates.

Preferably the substantially tubular, non-threaded paths defined by each boss are collinear. Preferably, the outer and inner edge of the or each boss is tapered or chamfered. A tapered or chamfered inner edge advantageously assists clamping to tapered beams. Preferably each substantially C-shaped plate is parallel.

The increased effectiveness of the beam clamp of the invention allows ancillary components to be usefully attached to the clamp. For example they may be provided in the rear portion. For this purpose, the substantially C-shaped plates may be provided with an aperture. Preferably the aperture is asymmetrically disposed in the rear portion of the substantially C-shaped plate. Particularly preferably, the aperture is situated in the compression zone in the rear

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portion of the substantially C-shaped plates. Ancillary components may be attached through the aperture on the beam clamp. For example, swivel means may be conveniently attached which allows an extensive range of articulation in the vertical or horizontal plane.

Typically, the beam clamp of the invention will be made from micro-alloyed steel strip which is optionally electro-zinc plated. More generally, the choice of material appropriate for this purpose will be readily made to the skilled man.

Viewed from a further aspect the present invention provides a clamping assembly for securing a structural component to a beam comprising:

- a beam clamp as hereinbefore defined;

- a drop rod insertable through a lower boss of the beam clamp and securable to the underside of the beam;

- optionally an elongate fastening means insertable through an upper boss of the beam clamp and securable to the upperside of the beam;

whereby the drop rod is attachable to said structural component.

Viewed from a yet further aspect the present invention provides a method for attaching a structural component to a beam comprising the steps of:

- locating an edge of the beam within the jaws of a beam clamp as hereinbefore defined;

- inserting a drop rod through the lower boss;

- impinging the drop rod in a lower securement position on the underside of the beam;

- securing the drop rod in the lower securement position;

- optionally inserting an elongate fastening means through the upper boss and impinging the elongate fastening

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means in an upper securement position on the upperside of the beam and securing the elongate fastening means in the upper securement position.

The invention will now be described in a non-limitative sense with reference to the accompanying Figures in which:

Figures 1a to d illustrate various views of an embodiment of the beam clamp of the invention;

Figures 2 and 3 illustrate alternative embodiments of the beam clamp of the invention; and

Figures 4 illustrate an embodiment of the beam clamp of the invention.

The beam clamp designated generally by reference numeral 1 comprises two substantially C-shaped parallel plates 2 and 3. Adjacent arms on each substantially C-shaped plate 2 and 3 are interconnected by a non-threaded boss (see 4 and 5). Each boss defines a substantially tubular path 5a for receiving an elongate fastening means or a drop rod (not shown). The boss 4 is provided with a chamfer 4a. The substantially tubular channels in each boss are collinear. Each plate is provided with an aperture 6 through which ancillary components may be attached.

Figures 2 to 4 illustrate the attachment of the beam clamp of the invention 1 to a beam 7 using drop rod 8 as an integral part of the clamping effect. In Figure 2, drop rod 8 passes through lower boss 5 and impinges the underside of the beam. The drop rod is threaded and secured to the underside of the beam by means of two bolts (9a and 9b) above and below the boss 5.

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In Figure 3, a fastening bolt 10 is fed through upper boss 4 to impinge on the upperside of the beam 7. The fastening bolt 10 is secured by two nuts 11a and 11b.

In Figure 4, a fastening bolt 10 is fed through upper boss 4 to impinge upon the upperside of the beam 7. The fastening bolt 10 is secured by two nuts 11a and 11b. The drop rod is secured by means of two nuts 17a and 17b. A swivel means 12 is attached to the beam clamp by means of aperture 13 in the rear portion of the substantially C-shaped plates. This gives a degree of articulation forward of the clamp of about 22° (see arrow 14). A degree of articulation in excess of 180° is possible in the vertical plane (see arrow 15). The twin set screw arrangement is used to improve pull off loads when an applied load is 90° to the setscrew axis.

Figure 5a is provided to illustrate the prior art beam or flange clamp. The beam or flange is inserted in jaws 1 and clamped directly by appropriate manipulation of cup point set screw 2 and locking nut 3. The rear portion of the main body is provided with a tapped or clear hole 4 for securing a drop rod (not shown). Figure 5b illustrates the use of the beam clamp with an attached J bolt 6 for suspension of pipework.

CLAIMS

1. A beam clamp comprising:
two overlapping, substantially C-shaped plates having two arms extending from an arcuate rear portion, wherein adjacent arms on said plates are interconnected by means of a boss, wherein each boss defines a substantially tubular, non-threaded path capable of receiving an elongate fastening means or drop rod.
2. A beam clamp as claimed in claim 1 wherein one or each substantially C-shaped plate has a non-uniform width.
3. A beam clamp as claimed in claim 1 or 2 wherein the rear portion of one or each substantially C-shaped plate is broader than the arms.
4. A beam clamp as claimed in any preceding claim wherein the width of one or each substantially C-shaped plate increases progressively from the arms to the rear portion.
5. A beam clamp as claimed in claim 4 wherein the ratio of the plate width at an arm to the plate width at the rear is in the range 0.40 to 0.70.
6. A beam clamp as claimed in claim 4 or 5 wherein the ratio of the plate width at an arm to the plate width at the rear is in the range 0.50 to 0.65
7. A beam clamp as claimed in claim 4 or 5 wherein the ratio of the plate width at an arm to the plate width at the rear is in the range 0.55 to 0.60.
8. A beam clamp as claimed in any preceding claim wherein the interior edge of the rear portion of one or each

substantially C-shaped plate is provided with a flattened portion.

9. A beam clamp as claimed in any preceding claim wherein the substantially tubular, non-threaded paths defined by each boss are collinear.

10. A beam clamp as claimed in any preceding claim wherein the outer and inner edge of the or each boss is tapered or chamfered.

11. A beam clamp as claimed in any preceding claim wherein each substantially C-shaped plate is parallel.

12. A beam clamp as claimed in any preceding claim adapted to attach an ancillary component in the rear portion.

13. A beam clamp as claimed in claim 12 wherein the substantially C-shaped plates are provided with an aperture.

14. A beam clamp as claimed in claim 13 wherein the aperture is asymmetrically disposed in the rear portion of the substantially C-shaped plate.

15. A beam clamp as claimed in claim 13 or 14 wherein the aperture is situated in the compression zone in the rear portion of the substantially C-shaped plate.

16. A clamping assembly for securing a structural component to a beam having an upperside and an underside, said assembly comprising:

a beam clamp as defined in any of claims 1 to 15;

a drop rod insertable through a lower boss of the beam clamp and securable to the underside of the beam;

optionally an elongate fastening means insertable through an upper boss of the beam clamp and securable to the upperside of the beam;
whereby the drop rod is attachable to said structural component.

17. A method for attaching a structural component to a beam having an underside and an upperside, said method comprising the steps of:

locating an edge of the beam within the jaws of a beam clamp as defined in any of claims 1 to 15;

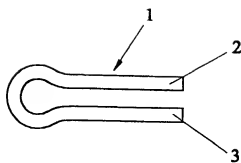
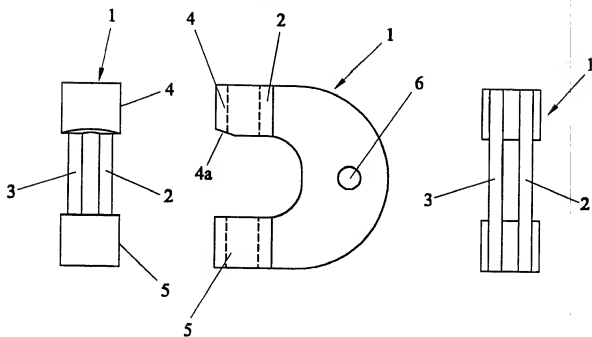
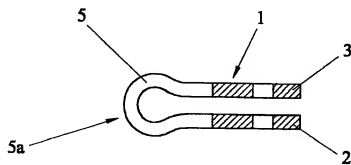
inserting a drop rod through the lower boss;

impinging the drop rod in a lower securement position on the underside of the beam;

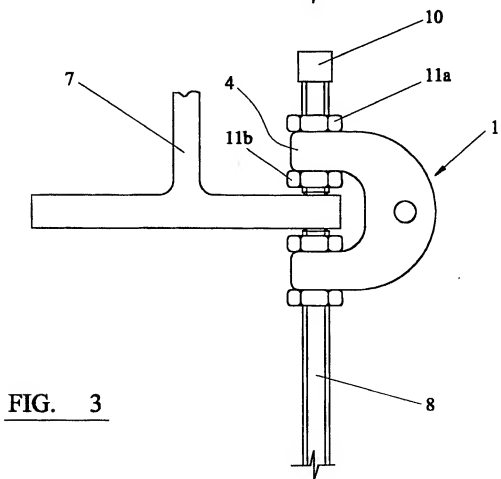
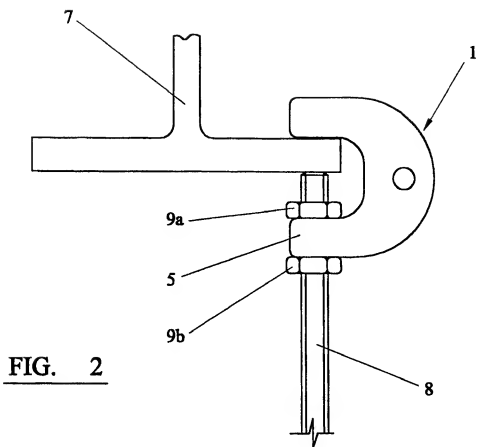
securing the drop rod in the lower securement position;

optionally inserting an elongate fastening means through the upper boss and impinging the elongate fastening means in an upper securement position on the upperside of the beam and securing the elongate fastening means in the upper securement position.

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FIG. 1dFIG. 1aFIG. 1bFIG. 1cFIG. 1e

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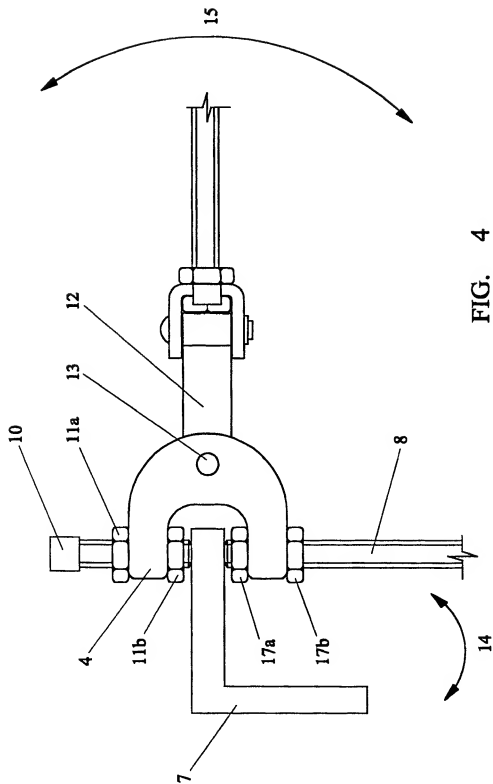
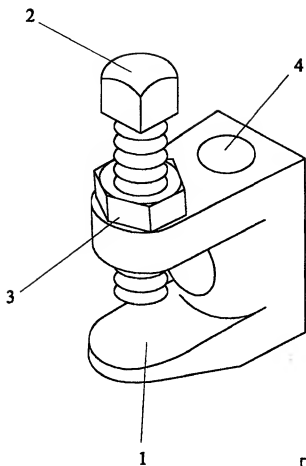
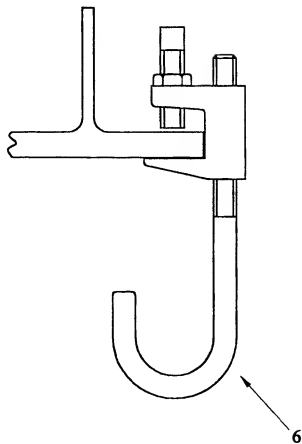


FIG. 4

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 00/00527

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 F16B2/06 B25B5/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F16B F16L B25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 659 561 A (O.C. KINDORF) 17 November 1953 (1953-11-17) page 1, column 1, line 1-16 page 1, column 1, line 37 -page 1, column 2, line 3 page 1, column 2, line 51 -page 2, column 1, line 4 figures 1-4	1,2,8, 11,12, 16,17
Y		3,9,10
Y	US 2 375 513 A (W.F. BACH) 8 May 1945 (1945-05-08) page 1, column 1, line 1-9 page 2, column 1, line 11-29 page 2, column 2, line 16-56 figures 11,12,14	3,9
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Information on patent family members

International Application No

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